

ABSTRACT OF THE DISCLOSURE

A nonvolatile memory device includes a substrate having a source region; a nanotube array including a plurality of nanotube columns that are vertically grown on the substrate such that a first end of the nanotube array is in contact with the source region, the nanotube array functioning as an electron transport channel; a memory cell formed around an outer side surface of the nanotube array; a control gate formed around an outer side surface of the memory cell; and a drain region in contact with a second end of the nanotube array and the memory cell, wherein the second end of the nanotube array is distal to the first end of the nanotube array.